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Conversation between Jeff Schmidt and Kristl Hathaway, 14 October 1994

Kristl Hathaway: Hi, how are you?

Jeff Schmidt: All right. Something that you mentioned at the meeting.... Do you remember who I am? I'm the one who sat all the way across on the opposite end of the table from you. One of the associate editors. I'm editing an article by Henry Ehrenreich of Harvard University...

KH: I know him.

JS: ...on strategic curiosity.

KH: On What!?

JS: It's called "strategic curiosity."

KH: All right (laughs).

JS: He's talking about that versus curiosity-based research. Curiosity-based versus strategic research. And he argues...

KH: That there is such a thing as strategic curiosity.

JS: Well, it's in the title. He argues, I guess, basically, that there isn't as much difference as you might think between strategic and curiosity-based research. And I remembered that you had said some very interesting stuff about how...

KH: How I choose what to fund in my program, right?

JS: Yeah, and I wonder if you could tell me that stuff again. I didn't note it at the meeting, and it sounded appropriate. And also you touched upon how scientists determine what to do next. All the choices they have.

KH: There's a model of curiosity-based research that is sort of like you just following your nose. And it goes on this little wandering path like if you took a pencil and just made scribbles on a board. But the truth is, from anything you do, there's always lots of puzzles. And you always say, "Gee, look-at, I stumbled on this new material, or I see this new phenomenon." And you can always push it in several different directions. And it seems to me that if you want your life to be meaningful, you want to push it in the direction that's gonna have the largest impact. And I see as two ways. I do research myself but I also run a funding program. Sometimes there's some basic fundamental understanding -- sometimes the research community has gotten hooked on something that they can't get past. You know, like a domain wall getting pinned. And if you can lend some

basic understanding that'll move a field forward, then that's one thing. Another thing is pushing in the direction of what you know to be the most useful properties. Both of those I think are.... I think, as a researcher, I guess I wouldn't call it say strategic. But in some sense, so that your work is gonna have an impact and be meaningful to, you know, other humans. [laughs] Rather than it is just going to kind of fold back on itself and solve this little puzzle and then solve some other puzzle. When you do something and there's something new, you don't just have one direction you can go from that. You generally have choices. And often they are, say, of equal scientific interest -- curiosity -- and I see that the impact, or the strategic stuff, you overlay on top of that. You say, "Well, I can't go five different directions at once, and they all look interesting." You pick to do first those things that'll have the largest impact, to move the field forward the most rapidly. And that's a good filter to use when you get proposals in. Often you'll get five proposals when you can fund one, and they're all good science. Very few people do bad science, you know. But one of them is attacking a problem that's really hanging up a whole.... You know if that problem got solved there'd be a rush of advancement in a field. And others are just doing something that won't move anything forward very fast. Does that sound like what I said before?

JS: Yeah, it is. It's very eloquently put. Do you think some scientists are better at selecting the directions that lead to useful results than other scientists?

KH: Yes [laughs], they were the ones that get funded. First of all I think it's something that comes with age and experience. The younger people tend to not have any basis by which to pick one problem from another. When we talk about what we should be doing differently with our students -- and they keep having these symposia at APS meetings. "We have to convince them there are other careers open for physicists." It always sounds like the subtext is: "If they're really not as good as... if they're not top rank, we can convince them they can go off into industry." It sounds crummy. I think what's wrong with that is that what you really should be saying is that you want to give the young people this sense of how to choose problems. So that it will matter to people and people will want to give them money. And I don't know how you teach that. But I do know when I get proposals in, often times you get what looks like a very well-thought-out proposal from a young person and they say they have the equipment to do it da da da da da. And then you get 'em on the phone and you say <u>why</u> do you want to do this? Why do you think it's important? And they sort of like, "Well, I don't know, a lot of other people are working in the field." They don't know why the field's important. They just have some vague feeling that it's hot or something like that. I think that it is something that young people have to learn somehow.

JS: In your present position do you do proposal funding or is it more staff researcher management or something like that?

KH: The reason is I have two separate positions at two separate institutions. Two and a half days a week I'm at a Navy lab where I'm a group leader of a research group, where we do research. When I have time I actually sit and do band-structure calculations and things like that. And the other half of the time I'm at the Office of Naval Research running about a two-million-dollar grant program, mostly university grants. So, I do both of them separately. It's not like I do some hybrid. I do them on different days of the week.

JS: So, the first one, though, that doesn't involve management?

KH: No, I'm not legally classified as a manager; I'd have to be one level up. We have sort of informal positions called group leaders, just so our real branch heads, or real managers, don't have to send memos out to every single human. I have some sort of informal responsibilities as group leader, but mostly its just research, doing calculations. It's five experimentalists and two theorists, and we do magnetic materials.

JS: And in your second position, the funding one, are the researchers aware of.... When they are making their decisions on which way to go, with all the choices they have, are they aware of what might be useful to the funding agency?

KH: Well, I spend a lot of time on the phone doing remedial education (for people?). I sometimes think somebody should write an article like for Physics Today: "How to get money out of the agency." But, you have to be kind of careful, because.... We're a basic research agency, very much like National Science Foundation except we're suppose to be a mission agency so we're suppose to fund areas that actually would eventually have impact on the Navy. So you have to figure out what that means. But we get a lot of people that call up and say, "Well, I'm available, what would you like me to work on?" [laughs] And I'm going, "I didn't want you to work on anything, because I didn't even know of you." [laughs]

JS: These are people at universities?

KH: Yeah. And they say, "Well, what are you interested in funding?" or "What do you want to fund?" Well, the truth is, we're waiting for the community to tell us. If I said in advance, "Well, I think someone needs to discover, you know, a scanning tunneling microscope," how would I do that?

So what you want is you want people to have good ideas. They're the people who see which directions they can go. They're there sitting in the lab and they have a problem and they say, "Oh, from this I see I could...this result inspires this experiment or this other experiment or this calculation. And, then, they should be thinking, "Well, which of these has some impact? And which agency would be interested in that kind of impact?" And then they can call up and you can kind of iterate with them. But they have to sort of narrow down who they want to talk to. They have to know enough about the impact of what they are thinking of doing to know which agency to talk to. I don't know, is that...? I know it sounds a little vague.

JS: No, that's very clear.

KH: It's hard to educate the young people in some sense, I think. The savvy old guys like Henry are...been serving on ARPA's advisory committee for a long, long time, and they know how things go.

JS: Right, right. That's very interesting. Have you ever written about the stuff we're talking about now?

KH: No. I never....

JS: It is interesting.

KH: It's a little scary. There's one guy here, Max Yoda[?], who has written about a two-page thing that he sends out to people on how to write a proposal to the Office of Naval Research, which is sort of tongue-in-cheek and is suppose to be funny and stuff like that. I maybe have a copy of it around here somewhere. It's a little dangerous given our jobs to put too much on paper. If you're going to be officially speaking for the agency you have to go and, you know, get it all cleared. There are some simple things that young people don't know. Most agencies put out some kind of slick magazine-like thing that tells how to submit proposals and what general areas they're interested in. But, then they often put out more detailed books, where they give like a page description of every grant they fund. Say, if you were at a university and you wanted to get something funded, you could call up all the different funding agencies and, if you knew what general area you were in, get a copy of what things they fund, and you can go through and start to figure out which program officer or scientific program manager or whatever they call them wherever is really a person who's got a program put together in that area. You're trying to find which person would be able to recognize the impact of the research that you're proposing that would have some impact. A lot of times young people call me up, 'cause I know them as graduate students and they go somewhere, and say how do I do this? And I often say, well, go to your sponsored research office at your

university and see how many of these books they have, and then if they don't have them just call -- they usually have the phone numbers at least to the agency -- call and get books and do a little homework, do a little research. There's nothing stupider than sending proposals to people who you should have been able to guess in advance who won't want to fund them -- a waste of time. But, I'm sure Henry has written a very good article, 'cause Henry knows all of this stuff. He's been on a lot of things.

JS: Well, I'm going to be editing it, and what you've told me now is good background for me as I go through that. I've had a long-standing interest in this kind of thing, which is sort of like the politics of science I guess you would call it, or something like that.

KH: There is a guy here at ONR who does research on that. On how to fund research. He does research on how to fund research. And he actually goes and presents scholarly papers at conferences and things. He's focused mostly on DOD types of things.

JS: Do you think his understanding is similar to yours?

KH: Well, he's not thinking so much at the individual investigator [level] like I do. He's been more in management, so he's looking at how do you set priorities and how do you decide in a mission agency what you ought to be funding at the basic level and how do you justify it as having impact on other levels and how does it transition to more applied stuff, and things like that. So, he's not so much thinking how an individual can get money as sort of how you do it at the agency-wide level, how do you justify it to Congress, and things like that.

JS: What is his name?

KH: His name is Ron Kostoff. I think I have some of his stuff. Sometime if I coming up there I could bring you copies if you're interested. I'll tell you what, your address must be in Physics Today, right?

JS: Yeah, it's that One Physics Ellipse address.

KH: I'll just look and if I see something that's interesting. You know, I've got a file. He often used to give me his papers, and some of them I read and some of them I didn't read. If it looks like some of them would be interesting, I'll just make a copy and stick it in the mail.

JS: Yeah, I'd appreciate that. I may write something on a freelance basis about this topic.

KH: Well, in fact, that could be done easier than somebody at an agency writing on the topic. Because then you could

talk to people at different agencies. And then you wouldn't have to use anybody's real name.

JS and KH: [laugh]

KH: Well, I mean some people might say something they didn't want attributed.

JS: Well, have you said anything you don't want attributed?

KH: No. No, I don't care too much.

JS: You wouldn't mind if I quoted you on some of this stuff?

KH: Well, I would rather if you are going to quote me that you ship something to me and let me check it, that's all. If you are going to quote me by name ever.

JS: Yeah. All right.

KH: Because then I can make sure it really is what I actually said.

JS: You are very articulate, so I'm pretty sure you said what you were trying to say.

KH: Oh, well, thanks. It didn't sound that way from my end, but if it got through to you, that's good. Because I was on the outside myself, you know. For many years I've tried to get funding, and a lot of the stuff doesn't make sense when you are on the outside looking in. And then when you work for an agency and you see what the pressures there are and what they have to do. When you are on the outside you think here's these funding officers who are just sitting their with all this money -- with their arms around it. And what you don't realize is that 80% of their time is spent selling the programs and getting the money. Very small percentage of their time is spent giving it away; most of it is spent getting it. Once you know that -- and Henry Ehrenreich knows that because he serves on ARPA's research advisory committee -- then you can kind of understand what you should contribute as a researcher to helping them do that part of it -- you know, how what you tell them helps them sell it. And it's more than just getting money yourself. It's getting the money to be there so you can have it.

JS: Exactly, that's the hard part always, I'm sure.

KH: I think it's interesting; I think it's an interesting subject. Something you guys could follow up on if you want. But I will see if I have something I could send you.

JS: Do you have a biographical sheet on yourself? Just something that describes the jobs that you have, the two

jobs. You say in the past you were doing funding in a different agency?

KH: No. No no no. It's just when I was doing research.... At the Navy labs we don't have any internal money. We have to go out to sponsors to get our salaries paid. So I was always trying to go sell stuff. I'll look and see if I have a short bio here. I'll stick it in the envelope, OK?

JS: Terrific.

KH: all right. Take care.

JS: Thanks a lot. And if I want to quote you on something, I'll send you what I think you said and you can tell me if it's right.

KH: Okay.

JS: Thanks a lot.

KH: Yeah. Bye bye.

JS: Bye.

20 October 1994

Kristl Hathaway graduated from Cornell University with a bachelor's degree in physics in 1967. She began graduate school at the University of California, San Diego, completing a Master's degree before leaving to follow her husband to a job with Pratt & Whitney Aircraft in West Palm Beach, Florida. At Pratt & Whitney she held the position of senior engineer in the compressor systems group, simulating compressor performance for the F15-class jet engines. Returning to Cornell University in 1971, she received her Ph.D. in condensed matter physics theory in 1976 and joined the magnetics group at the Naval Surface Warfare Center the same year. Her research is on the magnetoelastic behavior of rare earth transition metal alloys and amorphous metallic glasses, the electronic structure of transition metals, and the magnetic properties of thin films and multilayers. From 1985 through 1988 Dr. Hathaway managed basic research programs in solid state physics as a Scientific Officer in the Electronics Division of the Office of Naval Research and served as Division Director in 1989. While continuing research at NSWC on magnetoelastic multilayers, she is currently assigned on a half-time basis to manage a program on magnetic materials in the ONR Materials Division,

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Jeff Schmidt
2 December 1994

Kristl Hathaway

Dear Kristl:

Here are a couple of quotes for you to check from our conversation last month about research and funding. I am not sure if or where I'll use them (probably not in Physics Today at this time), but I wanted to make sure you had a chance to check them. The conversational form makes the somewhat arcane subject matter interesting, so I like the quotes just as they are. I hope you agree. Give me a call at 301-209-3048 and let me know what you think.

Jeff

There's a model of curiosity-based research that is sort of like just following your nose. It goes on this little wandering path, like if you took a pencil and just made scribbles on a board. But the truth is, from anything you do, there are always lots of puzzles. You say, "Gee, look, I stumbled on this new material" or "I see this new phenomenon." When you find something new, you don't just have one direction you can go from there. You generally have choices. You can always push it in several different directions. And often they are of equal scientific interest, or curiosity. You say, "Well, I can't go five different directions at once, but they all look interesting."

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research

M 5 DEC. 94; CALLED KRISTL HATHAWAY. THE QUOTES ARE OK, SHE SAYS. I ASK HER ABOUT THE WORDS I INSERTED IN BRACKETS AND SHE SAYS CHANGE "PEOPLE [UNIVERSITY PROFESSORS]" TO "RESEARCHERS, MANY OF WHOM ARE UNIVERSITY PROFESSORS,". SHE SAYS THE PEOPLE SHE FUNDS ARE 75-80% UNIVERSITY PEOPLE, AND THAT THEY ARE MORE LIKELY THAN OTHERS TO ASK WHAT TO DO. ABOUT 10% ARE AT NATIONAL LABS AND THE REST ARE IN INDUSTRY. SHE SAYS TO CHANGE "[SCIENCE]" TO "RESEARCH".

W 7 DEC. 94; CALLED HATHAWAY AT ONR. BY COINCIDENCE, SHE HAD TO ATTEND AN ETHICS TRAINING SESSION TODAY. SHE ASKED THE LAWYER WHO RAN IT ABOUT THE QUOTES. SHE SAID THAT IT IS OK FOR HATHAWAY TO GIVE QUOTES, BUT THAT IT SHOULD BE MADE CLEAR THAT HER VIEWS ARE NOT THOSE OF THE DEPARTMENT OF NAVY. HATHAWAY SAYS PERHAPS SAY ONR OR DEPT. OF NAVY. SHE ASKS THAT I SEND HER A COPY OF WHATEVER IS PUBLISHED USING THE QUOTES.

W 7 DEC. 94; HATHAWAY HAD CALLED EARLIER & LEFT A VOICE-MAIL MESSAGE SAYING THE ABOVE & SAYING I COULD IDENTIFY HER AS AN "ONR SCIENTIFIC OFFICER."